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RESEARCH PAPER

Evaluating Economic Returns and Employment Opportunities Through Oyster Mushroom Farming in Nagaland

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ABSTRACT

This study surveyed the economic viability of Oyster mushroom cultivation as a sustainable employment solution. Nagaland, due to its favorable climatic conditions, availability of raw materials, and labour is ideal for mass scale mushroom production. The main objective of this paper is to assess the foretaste of Oyster mushroom cultivation to narrow down the current unemployment status of the state which stands at 13.4%. Oyster mushroom cultivators were selected from Chumoukedima and Dimapur districts of the state, representing small, medium and large farmers classified by the number of cylinders. BCR of 1.83 (small farm), 1.43 (medium farm), and 1.23 (large farm) are highlighted, with the smaller farms recording a higher BCR, which is attributed to lower production and better resource efficiency. Employment generation analysis showed that Oyster mushroom cultivation creates significant job opportunities for skilled, semi-skilled and unskilled workers. Cultivation generates employment across the production cycle from substrate preparation and spawning to harvesting and marketing. The findings indicate that Oyster mushroom cultivation is a profitable business with employment generation ability, offering a viable path for economic development and unemployment reduction in Nagaland.

HIGHLIGHTS

- Oyster mushroom farming reported higher BCR from different farm sizes that are small farms (1.83), medium farms (1.43), and large farms (1.23).
- The enterprises created skilled, semi-skilled and unskilled workers creating employment.
- A high BCR indicates that Oyster mushroom cultivation is a financially viable and sustainable livelihood.

Keywords: Mushroom, Oyster mushroom, Nagaland, Unemployment, Benefit-cost ratio

Mushrooms are a valued food in the North East and there is untapped potential for agriculture-based entrepreneurship in the North East, with the region's abundant natural resources and potential for agri-business to create employment. The horticulture department has promoted mushroom cultivation, but its large-scale production is yet to take off. Mushroom production being climate-suited, profitable and less land-dependent can generate employment for youth and women (Ram and Devi, 2019).

Nagaland is a biodiversity-rich state packed with different species of edible and non-edible mushrooms. While some edible wild mushrooms are found locally others are commercially grown. Commercially grown mushrooms include Oyster mushrooms, Shiitake mushrooms, paddy straw mushrooms and Button mushrooms. Oyster mushrooms are more preferred in Nagaland for their low cost of production and higher yield per unit area compared to other agricultural activities (Sharma *et al*. 2004).

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The Periodic Labour Force Survey (2023-2024) reports that Nagaland has one of the highest educated unemployment rates in India at 13.4%. Despite numerous government schemes, many educated youths are unwilling to engage in traditional farming because of the high risk and low returns.

Oyster mushroom cultivation, due to its low investment, short production cycle and suitability as a small-scale start-up offers a potential livelihood option. It provides year-round production, value addition and income opportunities for seasonal farmers. However, there is limited empirical evidence on long-term economic viability under Nagaland's specific climate and marketing conditions. Many existing studies use data drawn from other states, overlooking the local potential of Oyster mushroom farming to reduce unemployment. This lack of economic analysis and evidence constrains policy makers and entrepreneurs from deciding whether Oyster mushroom farming can serve as a sustainable solution for unemployment.

This study aimed to assess the feasibility of Oyster mushroom farming as an agri-enterprise to solve the problem of unemployment in Nagaland by analyzing the cost-benefit of Oyster mushroom cultivation and using average skill level to highlight the number of employment generation based on the skill level of the workers.

METHODOLOGY

Oyster mushroom farmers from the two districts Chumoukedima and Dimapur were selected using purposive sampling to evaluate the employment generation, cost and profitability of mushroom cultivation. To estimate the total cost and employment generation, the following analysis was used:

Cost- benefit analysis

$$Total\ cost = TFC + TVC + Depreciation$$

Fixed Cost: Cost of building the shed, depreciation, balance weights and small equipment are all included in fixed costs

Variable cost: Cost of straw, spawn, chemical, labour, electricity, poly bags and miscellaneous items etc are included in Variable cost

Net income over total cost = Gross Income – Total cost

Net income over variable cost = Gross Income – Variable cost

To check the profitability of mushroom cultivation, Benefit- cost ratio was estimated;

$$\text{BCR based on total cost} = \frac{\text{Gross Return}}{\text{Total cost}}$$

$$\text{BCR based on variable cost} = \frac{\text{Gross Return}}{\text{Variable cost}}$$

Weighted mean approach for measuring employment generation based on different skills.

The Weighted mean for given set of non-negative data;

$$x_1, x_2, x_3, \ldots\ldots\ldots x_n$$

with non-negative weights;

$$w_1, w_2, w_3, \ldots\ldots\ldots\ldots\ldots\ldots w_n$$

can be derived from the following formula:

$$\bar{x} = \frac{w_1 x_1 + w_2 x_2 + \cdots + w_n x_n}{w_1 + w_2 + \cdots + w_n}$$

Where,

x, is the representing value

w, is the number of occurrences/ skill level of

$\bar{x}$, is the weighted mean/ mean skill score

RESULTS AND DISCUSSION

Stratification of sampled Oyster mushroom farms on the basis of mushroom, cylinders

Table 1: Classification of farms based on mushroom cylinders and average cylinders in each farm size

Farm size	No. of farms	Average number of bags	Percentage
Small (<500)	24	233.75	53.33
Medium (500-1000)	12	732.5	26.67
Large (>1000)	9	2744.44	20
Total	**45**		**100**

Source: *Field Survey (2024).*

Based on the number of Oyster mushroom cylinders, mushroom growers are categorized as: small farms (<500 cylinders), medium farms (500-1000 cylinders) and large farms (>1000 cylinders). Of the 45 farms surveyed, small farms constituted the majority (24 farms, 53.33%), with an average of 233.75 cylinders per farm. 12 medium farms account for 26.67% of the total, with an average 732.5 cylinders per farm. Large farms represented 9 farms (20%) with an average of 2744.44 cylinders per farm.

Economic analysis of Oyster mushroom cultivation

Table 2 represents the economic analysis of the cost and return of Oyster mushroom cultivation for small, medium and large farms. The total price and gross return of Oyster mushrooms are calculated based on a market price of ₹ 150 which varies significantly according to farm size- 52,593 for small farms, ₹ 1,68,750 for medium farms and ₹ 3,37,500 for large farms. For small farms total cost amounts to ₹ 28,700, medium farms ₹ 1,18,300 and large farms at ₹ 2,18,000. Accordingly, net income accounts at ₹ 36,093 for small farms, ₹ 1,27,450 for medium farms and ₹ 2,37,500 for large farms. The benefit cost ratio shows that small farms (1.83) are more profitable than medium (1.43) and large farms (1.23), which indicate that while larger farms produce more mushrooms on a large scale, small-scale farms tend to achieve greater cost and profitability relative to their investment.

Employment generation through mushroom cultivation

The table 3 shows the number of employment generated through mushroom cultivation based on the different skill levels of the labourers which are categorized as skilled, semi-skilled and unskilled. A score weight for each skill level is given as follows: skilled = 3, semi-skilled = 2 and unskilled = 1. This activity generates employment across the production cycle of Oyster mushrooms, from substrate preparation to spawning, harvesting and marketing.

The analysis of labour distribution across 45 farms shows a relationship between farm size and the distribution of the labour workforce. From the table, it is clear that larger farms employ the highest proportion of skilled labour, with an average skill score of 0.23, which indicates the use of technically efficient labour in larger farm sizes. Medium farms

Table 2: Cost and return incurred on mushroom cultivation

Average cost and Return	Amount (₹) (small <500)	Amount (₹) (medium 500-1000)	Amount (₹) (Large >1000)
Total Price of mushroom (@ ₹ 150 per kg)	52,593	1,68,750	3,37,500
Gross return	52,593	1,68,750	3,37,500
TFC	12,200	77,000	1,30,000
TVC + Depreciation	16500	41,300	79,500
Total Cost (TFC + TVC + Depreciation)	28,700	1,18,300	2,18,000
Net income	36093	1,27,450	2,37,500
B:C Ratio	1.83	1.43	1.23

Source: *Field Survey (2024).*

Table 3: Classification of labours and calculation of different mean scores of labour employed on small, medium and large farms

Farm size	Skilled labour (Score = 3)	Semi- skilled labour (Score = 2)	Unskilled labour (Score = 1)	Total number of workers	Mean skill score
Small	2	5	5	12	0.08
Medium	7	22	5	34	0.17
Large	16	26	14	56	0.23

Source: *Field Survey (2024).*

followed with an average score of 0.17, followed by small farms with a mean score of 0.08. The total number of workers gradually increases with farm size; accordingly, there is a substantial increase in the proportion of skilled and unskilled labour, which suggests that an increase in farm size not only generates more employment but also creates higher-quality jobs. This analysis indicates the role of farm size in terms of both the quantity and quality of employment generation in this sector.

CONCLUSION

The economic analysis of Oyster mushroom farms shows a clear distinction between cost, return and employment generation covering small, medium and large farms. The cost analysis of small mushroom farms shows that despite their limited and small scale of production, they have the highest benefit- cost ratio of 1.83, followed by medium farms at 1.43 and large farms at 1.23. This data indicates that smaller units that often rely on lower inputs and limited labour utilization proved to be more profitable per unit investment than larger mushroom farms. Smaller farms are more cost-efficient due to lower fixed costs, low to almost no expenses on labour and better utilization of resources. Medium and large farms with generally higher gross returns have higher production costs, with greater spending margin in fixed cost and operational costs, which reduces their profitability.

Employment generation analysis shows that larger farms employ more workers (56) and also have the highest mean skill score of 0.23, which indicates maximum use of skilled labour in their workforce while semi-skilled and unskilled workers are used in small and medium farms.

In general, Oyster mushroom cultivation in Nagaland not only contributes to the overall income of the farmers but also provides employment opportunities to the people based on their different skill levels. While smaller farms are more efficient in terms of return on investment, making them an operational tool for small-scale entrepreneurs, while larger farms are more reliable in terms of employment generation. Strengthening and regularly organizing mushroom production training can contribute to household income and employment, structured market linkages, optimizing cost structures and financial assistance such as micro loans or grants which could further enhance both profitability and employment potential in this sector (Verrna *et al.* 2025)

LIMITATIONS

The study on Oyster mushroom cultivation is geographically confined to Chumoukedima and Dimapur districts of Nagaland, which may not fully acknowledge the diversity of production practices, market conditions and resource use in other parts of the state. As data were collected for a single production cycle, data representation may vary according to seasonal variations in yield, cost and price. This limitation restricts the ability to analyse the profitability of mushroom farms across the state. Figures of employment generation are based on self-reported labour inputs and skill levels provided by the farmers. BCR is based on the total cost, variable cost, gross return and net income; however, it did not incorporate changes in market access over time which could influence long-term financial viability.

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